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CHORIZANTHE MINUTIFLORA (POLYGONACEAE: ERIOGONEAE), A NEW NARROW ENDEMIC CALIFORNIA SPECIES

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ABSTRACT

A rare, narrowly restricted spineflower (*Chorizanthe*) is described from an isolated coastal scrub community on the Fort Ord National Monument, Monterey Co., California. *Chorizanthe minutiflora* has the smallest flowers (1.5–2 mm long) of the genus and is allied to both *C. angustifolia* of San Luis Obispo and Santa Barbara counties to the south, and *C. cuspidata* of the San Francisco Bay region to the north.

Chorizanthe minutiflora R. Morgan, Styer, & Reveal, **sp. nov. TYPE: CALIFORNIA. Monterey Co.**: Fort Ord National Monument, Butterfly Valley E of Barloy Canyon Road, 0.65 mi NE of Elliott Hill, 0.2 mi SSE of Machine Gun Flat and 0.9 mi W of Sandstone Ridge, 6.2 air mi NE of Seaside and 5.8 air mi SW of Salinas, 146 m elevation, 36° 37′ 59.1″ N, 121° 44′ 37.6″ W, 24 May 2014, *D. Styer and R. Morgan s.n.* (holotype: UC; isotypes: BH, CAS, GH, NY, RSA, US, UTC). Figures 1–11.

Plants (Figs. 2–3) prostrate annuals, 0.1–0.2 dm tall, 0.5–2 dm across, yellow-green when fresh, tawny when dried, villous; **leaves** (Fig. 10) basal, the petiole (0.3) 0.5–1.2 cm long, the leaf-blade oblanceolate, 0.5–2 cm long, 0.3–0.6 cm wide, thinly villous on both surfaces; **inflorescences** (Figs. 4–5) rather dense with secondary branches suppressed, not disarticulating at the nodes, greenish to reddish; **bracts** (Fig. 6) 2, opposite, similar to proximal leaf blades only reduced, short-petiolate, becoming linear and aciculate at distal nodes, acerose, 0.3–0.7 (1) cm long, 0.1–0.3 cm wide, the awn 0.2–0.5 mm long; **involucres** (Fig. 6) solitary, cylindric, not ventricose, 3-angled and 6-ribbed, 1.3–1.7 (2) mm long, not corrugate, villous abaxially, greenish, without scarious margins, the teeth spreading, 0.5–1.5 mm long, the awns (Fig. 9) of two sizes, uncinate with the longer ones 1.5–2 mm long alternating with the shorter ones 1–1.5 mm long; **flowers** (Fig. 8) included to slightly exserted, the perianth slightly bicolored with hypanthium greenish-white and tepals white, cylindric, 1.5–2 mm long, the hypanthium glabrous, 1/2 length of perianth, the tepals monomorphic, oblong to narrowly obovate, sparsely villous abaxially on lower portions, cuspidate apically, the stamens 3, slightly exserted, the filaments distinct, adnate at base of hypanthium, 1.5–2 mm long, glabrous, the anthers orange to pink or purplish, ovate, 0.2–0.3 mm long; **achenes** (Fig. 9) light brown, globose-lenticular, 1.3–1.8 mm long, the embryo straight.

Paratypes: **CALIFORNIA. Monterey Co.**: Crescent Bluff Road, 11 Feb 1994, *R. Morgan 2144* (UCSC, cultivated seedlings); Fort Ord National Monument, S slope down to Butterfly Valley, 3 May 2010, *R. Morgan 4981a* (UCSC); Fort Ord National Monument, Butterfly Valley E of Barloy Canyon Road, 146 m elevation, 36° 37′ 59.1″ N, 121° 44′ 37.6″ W, 5 May 2014, *D. Styer s.n.* (BH, RSA, UC).

Etymology

Latin, *minutus*, minute, small, and *floris*, flower, as to the small size of the flowers.

Distribution and ecology

This rare plant is known only from Fort Ord National Monument, northwestern Monterey Co., California, where the plant occurs in sandy places in coastal scrub communities at elevations 140–150 m (Figs. 1–2); it flowers from late April to early July. Associated plants include *Chorizanthe diffusa*, *Chorizanthe pungens*, *Cardionema ramosissimum*, *Navarritia hamata* subsp. *parviloba*, *Navarretia mellita*, *Cryptantha clevelandii*, *Cryptantha micromeres*, *Plagiobothrys* sp., *Horkelia cuneata* var. *cuneata*, *Erodium botrys*, *Erodium cicutarium*, *Deinandra corymbosa*, *Crassula tillaea*, *Anagallis arvensis*, *Camissoniopsis micrantha*, *Logfia gallica*, and *Pterostegia drymarioides*. The weedy grasses are *Bromus hordeaceus*, *Bromus diandrus*, *Bromus madritensis* subsp. *rubens*, *Festuca bromoides*, *Avena barbata*, *Aira caryophyllea*, *Briza maxima*, and *Briza minor*. Some woody plants of the chaparral adjacent to or interspersed in the *Chorizanthe* habitat are *Acmispon glaber* var. *glaber*, *Eriodictyon californicum*, *Toxicodendron diversilobum*, *Baccharis pilularis* subsp. *consanguinea*, *Salvia mellifera*, and *Ceanothus thyrsiflorus*.

Discussion

Much of the former Fort Ord Army Military Base habitat has been protected in what is now Fort Ord National Monument. This area in Monterey County, California, contains an ecological island of maritime chaparral with several shrub species common on Fort Ord but rare to nonexistent only a few kilometers away (e.g., *Arctostaphylos montereyensis* Hoover, *A. pumila* Nutt., *A. hookeri* G. Don subsp. *hookeri*, *Ceanothus rigidus* Nutt., *Ericameria fasciculata* (Eastw.) J.F. Macbr.). Only recently has the uniqueness of several of the herbaceous members of the flora been uncovered.

Three decades ago, while working for Jones and Stokes at Fort Ord, Morgan found three or four small populations of an unusual *Chorizanthe* he could not identify but which he later keyed to *C. angustifolia* Nutt. Although the Fort Ord population was placed on the California Native Plant Society list of 1996, it was treated as lost or questioned. On 10 May 2010, Morgan and Styer, while walking an old unpaved army road (Fig. 2) into the vernal pool area called "Butterfly Valley," discovered a new colony of the long-lost "*C. angustifolia,*" and it was added to the Fort Ord plant list. Subsequently, the same *Chorizanthe* has been found in three other Fort Ord locations, always in disturbed, open places in or near the Fort Ord maritime chaparral. By 2013 Morgan realized that the Fort Ord *Chorizanthe* that had been called *C. angustifolia* did not match that species elsewhere and contacted Reveal, although too late in the year for proper collections. On 5 May 2014 fresh plants were sent to Reveal who noted the strikingly small flowers, the smallest in the genus.

The *Flora of North America* (Reveal 2005) recognizes 50 species of *Chorizanthe*, a New World genus occurring in North and South America. In North America, north of Mexico, 33 species are recognized, all of which are annuals and all of which occur in California. In fact, 24 of the 33 species are endemic to California. It thus appears that California is a center of species radiation of the genus.

The area in which the population grows is sparsely vegetated. It is especially noticeable that where the alien annual grasses cover the ground more densely there are no *Chorizanthe minutiflora*

plants (compare this condition in Figure 2, where the Fort Ord spineflower may be seen in the sparsely vegetated abandoned roadbed, but further up the road the spineflower is missing where the weedy grass is more dense).

The immediately obvious feature of the Fort Ord spineflower, *Chorizanthe minutiflora*, apart from its distinctive uniformly yellow-green color, is its tiny flower that is barely observable at full anthesis as only the free portions of the tepals, with a tiny cusp, exceeds the narrow, cylindric involucral tube, which itself is mostly less than 2 mm long. As such our new species resembles *C. cuspidata* S. Wats., now known from the greater San Francisco Bay region of northern San Mateo County, California, northward into Marin and Sonoma counties. Unlike *C. minutiflora*, *C. cuspidata* is densely pubescent so that the plants are tannish in color as opposed to the yellow-green color and sparser pubescence of the new plant. As implied by its name, *C. cuspidata* typically has cuspidate tepals (although they do vary from truncate to erose), a feature shared by *C. minutiflora*. The involucral awns of both species are uncinate apically, although the awns of the villose spineflower, *C. cuspidata* var. *villosa* (Eastw.) Munz, are straight.

The Fort Ord spineflower was once identified as *Chorizanthe angustifolia*. That species is also densely pubescent, like *C. cuspidata*, but its flowers are exserted from the involucral tube (although not by much), and the tepals are erose apically. A useful field character is that the involucral tube of *C. angustifolia* tend to be reddish whereas those of *C. cuspidata* and *C. minutiflora* are greenish. Likewise, in the two allied species the involucral margins (albeit more commonly so in *C. angustifolia* than *C. cuspidata*) occasionally can have scarious margins — such margins are lacking in *C. minutiflora*.

All of these species belong to *Chorizanthe* subsect. *Pungentes* Goodm. (Goodman 1934; Reveal & Hardham 1989). The only element in Monterey County that *C. minutiflora* might be confused with is the typical expression of *C. robusta* Parry. Unlike the Fort Ord spineflower, the robust spineflower is a decumbent to spreading plant with longer involucres (2.5–4 mm long) and flowers (2.5–4 mm), and a bicolored perianth that is pubescent abaxially. Also, the involucral margins of *C. robusta* are distinctly scarious with a bright white edge.

The only other *Chorizanthe* closely sympatric with our new plant are *Chorizanthe diffusa* (Fig. 8) and *C. pungens*. All three can be distinguished in the field by their color: in *C. diffusa* a contrasty combination of white over gray-green inflorescence and reddish herbage; in *C. pungens* a uniform soft pinkish-gray; and in *C. minutiflora* a uniform yellow-green. Identity of these three species can be confirmed by the broad white involucral margins of *C. diffusa*, the narrower pinkish margins and nine stamens of *C. pungens*, and the lack of margins and three stamens of C. *minutiflora*.

The following key, modified from that in Reveal (2005: 447), is appended.

1. Tepals entire; flowers glabrous, distinctly bicolored, the hypanthium yellow, the tepals white, 2.5–3 mm long; stamens 3–9; Santa Cruz and Monterey cos. south to Santa Barbara Co.
..... **Chorizanthe diffusa**
1. Tepals bilobed, erose or cuspidate; flowers pubescent abaxially, not distinctly bicolored.

2. Plants sparsely pubescent, yellow-green; flowers 1.5–2 mm long, sparsely pubescent abaxially on the tepals; Fort Ord National Monument, Monterey Co., California . **Chorizanthe minutiflora**
2. Plants densely pubescent, tannish to reddish or grayish; flowers 2–3.5 mm long, pubescent abaxially.

3. Tepals cuspidate; involucres 1.5–3 mm long; flowers 2–3 mm long; San Francisco Peninsula ..... **Chorizanthe cuspidata**
3. Tepals erose apically; involucres 1.5–2.5 (3) mm long; flowers 2–3.5 mm long; Monterey and Santa Cruz cos. south to Santa Barbara Co.

4. Involucres distinctly margined, the margin white or pink to purple, the involucral tube 2–2.5 mm long; flowers 2–3.5 mm long; stamens 9; coastal beaches and inland mountain slopes in Monterey and Santa Cruz cos. ..... **Chorizanthe pungens**
4. Involucres thinly margined, the margin pinkish, the involucral tube 1.5–2 (2.5) mm long; flowers 2–3 mm long; stamens 6–9; coastal mesas and foothills of San Luis Obispo and Santa Barbara cos. ..... **Chorizanthe angustifolia**

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Figure 1. Type area, Butterfly Valley, Fort Ord National Monument. Photo © David Styer

Figure 2. Abandoned road site with *Chorizanthe minutiflora* and scattered grasses. Photo © David Styer.

Figure 3. Habit of *Chorizanthe minutiflora*. Photo © David Styer.

Figure 4. Inflorescence of *Chorizanthe minutiflora.* Photo © David Styer.

Figure 5. Detail of the inflorescence of *Chorizanthe minutiflora.* Photo © David Styer.

Figure 6. Aciculate bracts subtending the involucres of *Chorizanthe minutiflora*. Photo © James L. Reveal

Figure 7. Details of the involucre of *Chorizanthe minutiflora*. Photo © James L. Reveal

Figure 8. Details of the flowers of *Chorizanthe minutiflora*. Photo © James L. Reveal.

Figure 9. Unequal uncinate involucral awns and an exposed achene (left). Photo © James L. Reveal.

Figure 10. Leaves of *Chorizanthe minutiflora*. Photo © James L. Reveal.

Figure 11. Mixed population of *Chorizanthe diffusa* and *C. minutiflora*. Photo © David Styer.